DOCUMENT RESUME

ED 304 659 CS 009 540

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TITLE Effects of Cognitive Development Level on the Relationships between Self-Efficacy, Causal Attribution, and Outcome Expectancy and Performance in Reading and Writing.
PUB DATE Dec 88
NOTE 10p.; Paper presented at the Annual Meeting of the National Reading Conference (38th, Tucson, AZ, November 29-December 3, 1988).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cognitive Development; Developmental Stages; *Reading Ability; Reading Attitudes; Reading Research; Self Efficacy; Writing Research; *Writing Skills
IDENTIFIERS *Writing Achievement; Writing Attitudes; Writing Development

ABSTRACT

A study examined how specific developmental levels of cognitive ability affect the relationship between beliefs and performance; how cognitive development levels affect reading and writing performance; and how developmental level affects the interactions between the reading and writing domains. Subjects, 150 undergraduates between the ages of 18 and 23, were measured for cognitive developmental level, self-efficacy, causal attribution for reading and writing success and failure, outcome expectancy, locus of control, and reading and writing performance. Results indicated differences between developmental classification (concrete, transitional, formal) in the relationships between beliefs and reading or writing performance, and indicated changes in the regression models and the pattern of correlations between beliefs and reading or writing at the developmental level. Results further indicated differences between developmental classification in performance in reading and writing, and the relationship between reading and writing. Findings suggest that the specific cognitive skills represented by formal operational thinking influence both the magnitude of performance and beliefs and the structure of reading, writing, and belief relationships. (MM)

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EFFECTS OF COGNITIVE DEVELOPMENT LEVEL ON THE RELATIONSHIPS BETWEEN SELF-EFFICACY, CAUSAL ATTRIBUTION, AND OUTCOME EXPECTANCY AND PERFORMANCE IN READING AND WRITING

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CS009540

Presented at the National Reading Conference: Tucson, December, 1988.

Effects of Cognitive Development Level On the Relationships Between Self-Efficacy, Causal Attribution, and Outcome Expectancy and Performance in Reading and Writing

Previous research has found that self-efficacy for reading and writing, causal attributions for success and failure in reading and writing, and outcome expectancies concerning the importance of reading and writing for achieving goals are significantly related to reading and writing performance (Bruning, Shell, & Murphy, 1987; Hiebert, Winograd, & Danner, 1984; McCarthy, Meier, & Rinderer, 1985; Nicholls, 1979; Paris & Oka, 1986; Shell, Murphy, & Bruning, 1989). Additionally, this research has found that beliefs and performance for reading and writing are canonically related through a single underlying structure and that the strengths of the belief - performance relationships and the structure of the canonical relationship change across grade levels from elementary school to college. This previous research has established that the belief-performance relationship and the inter-relationships between reading and writing undergo developmental change. The nature of this change, however, has been examined only in respect to grade level differences. Examination of the effects of developmental change in specific cognitive processes has not been done.

The Piagetian model of cognitive development provides a framework for examining how specific change in cognitive ability affects these previously identified belief-performance relationships in reading and writing. Additionally, within the Piagetian framework, cognitive level has been found to be related to actual performance skill in writing and reading; thus, cognitive developmental level may itself directly mediate reading and writing performance. The purposes of this research project

were to (1) examine how specific developmental levels of cognitive ability affect the relationship between beliefs and performance, (2) examine how cognitive development levels affect reading and writing performance, and (c) examine how developmental level affects the interactions between the reading and writing domains.

Method

Subjects were 150 undergraduate college students (Male = 29; Female = 121) between the ages of 18-23.

Measures

Cognitive developmental level was assessed using the Test of Logical Thinking (TOLT). This test provides a score indicating which of three levels of cognitive development (concrete operations, transition, formal operations) the person has attained.

Self-efficacy was assessed by having subjects indicate their confidence on a scale of 0-100 for performing reading and writing tasks. The reading instrument contained two subscales: (a) reading and understanding 17 reading tasks (e.g., a novel, an introductory text book), and (b) performing 9 reading sub-skills (e.g., recognize parts of speech). The writing instrument contained two subscales: (a) completing 16 writing tasks (e.g., write a 15 page term paper), and (b) performing 8 writing sub-skills (e.g., correctly use parts of speech). Self-efficacy scores were computed by calculating subscale mean scores resulting in two self-efficacy scores each for reading and writing.

Causal Attribution for reading and writing success and failure was measured using a semantic differential scale. Separate scales were used for reading and writing and for success and failure attribution. On each scale, subjects were asked to choose which of two causes was more

important and indicate the degree of difference. For each scale, scores for the seven causes assessed were created by summing the pairwise scores for each cause.

Outcome Expectancy was assessed by having subjects rate on a 7-point Likert scale the importance of reading and writing for achieving 15 life goals. Outcome expectancy scores for reading and writing were created by calculating the mean score of the 15 items in each scale.

Locus of Control was measured with the Rotter Internal-External Locus of Control Scale.

Reading performance was measured with the Degrees of Reading Power test (DRP). This test provides a single score indicating level of reading comprehension.

Writing performance was assessed using a holistically/analytically scored writing sample with assessment of conventions, syntactic maturity, style, and organization. Subjects were asked to write a concise, organized essay explaining all the qualities and characteristics of an excellent teacher.

Results and Discussion

Results, summarized in Tables 1 - 4, indicated differences between developmental classification (concrete, transitional, formal) in (a) the relationships between beliefs and reading or writing performance, indicated by changes in the regression models (Table 1) and changes in the pattern of correlations between beliefs and reading or writing (Table 3) at each developmental level; (b) performance in reading and writing (Table 2); and (c) the relationship between reading and writing (Table 2). These findings suggest that the specific cognitive skills represented by formal operational thinking influence both the magnitude

of performance and beliefs and the structure of reading, writing, and belief relationships.

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Table 1
Regression Models

Step	Variable	Cumm. R	Cumm. R^2	R^2 Change	F Change
	Total Sample				
Reading (N = 150)					
1	Reading Component Efficacy	.446	.199	.199	36.84**
2	Writing Success Teacher (N)	.493	.243	.044	8.47**
3	Reading Success Ability (N)	.526	.277	.034	6.87**
4	Reading Success Skill	.555	.308	.031	6.46*
5	Writing Success Effort (N)	.575	.330	.022	4.79*
6	Reading Success Effort	.595	.354	.024	5.26*
7	Writing Success Skill	.610	.372	.018	4.10*
Writing (N = 148)					
1	Writing Component Efficacy	.301	.091	.091	14.56**
	Concrete Operations Group				
Reading (N = 58)					
1	Reading Component Efficacy	.626	.392	.392	36.09**
2	Writing Success Effort (N)	.707	.500	.108	11.84**
Writing (N = 57)					
1	Writing Component Efficacy	.367	.134	.134	8.51**
2	Writing Failure Task Difficulty	.457	.209	.075	5.11*
	Transition Group				
Reading (N = 64)					
1	Writing Success Teacher (N)	.397	.158	.158	11.62**
2	Writing Success Luck (N)	.486	.236	.078	6.23*
Writing (N = 63)					
1	Writing Failure Teacher (N)	.301	.090	.090	6.06*
	Formal Operations Group				
Reading (N = 27)					
1	Writing Success Luck (N)	.782	.612	.612	39.39**
2	Reading Component Efficacy	.875	.766	.154	15.75**
3	Reading Failure Skill	.914	.835	.070	9.71**
4	Writing Success Ability	.934	.872	.037	6.31*
5	Writing Failure Task Difficulty	.948	.898	.026	5.41*

Step	Variable	Cumm. R	Cumm. R^2	R^2 Change	F Change
Writing (N = 27)					
1	Writing Component Efficacy	.534	.285	.285	9.99**
2	Writing Success Luck (N)	.765	.585	.299	17.31**
3	Writing Task Efficacy	.815	.664	.079	5.44*
4	Writing Failure Effort (N)	.876	.768	.104	9.84**
5	Writing Success Enjoyment (N)	.902	.813	.045	5.12*

Note. N = Negative Correlation.

*$p < .05$. **$p < .01$.

Table 2
Means and Correlations Between Reading and Writing
by Logical Thinking Classification

Reading Mean			
Total Sample	Concrete	Transitional	Formal
55.59	51.50	57.31	60.52

Writing Mean			
Total Sample	Concrete	Transitional	Formal
14.60	14.33	14.73	14.89

Reading - Writing Correlation			
Total Sample	Concrete	Transitional	Formal
.40	.28	.42	.65

Table 3
Means and Correlations By Logical Thinking Classification

Variable	Mean Conc.	Mean Trans.	Mean Formal	Correlation Reading C	Reading T	Reading F	Writing C	Writing T	Writing F
Locus of Control	12.10	12.61	9.70	-.01	-.06	.02	-.07	.20	-.19
Reading									
Task Efficacy	83.78	83.84	84.74	.42	.30	.19	.29	.20	.30
Component Efficacy	86.77	89.54	89.80	.63	.10	.36	.20	.12	.42
Outcome Expectancy	5.13	5.35	5.00	.15	.04	.00	.13	-.02	.12
Success Ability	8.50	7.31	7.59	-.30	-.08	.19	-.10	-.11	.11
Success Skill	6.81	7.16	7.93	.11	.04	.34	.13	-.06	.14
Success Effort	9.16	9.22	10.82	-.11	.11	.33	-.07	.10	.03
Success Enjoyment	8.40	8.69	9.22	-.14	.11	.00	.01	.00	-.25
Success Task	5.29	5.55	4.56	-.01	-.09	.04	.10	.09	-.02
Success Luck	.29	.34	.19	-.33	-.11	-.35	-.18	.05	-.43
Success Teacher	6.03	5.27	3.63	-.02	-.27	.34	.20	-.01	.32
Failure Ability	6.85	6.36	6.63	-.04	.12	.36	.06	.16	.39
Failure Skill	6.67	6.42	6.52	-.18	-.01	.49	.09	.07	.24
Failure Effort	8.52	9.11	10.52	.10	.01	.44	.12	.18	.06
Failure Enjoyment	6.50	7.81	7.56	-.06	.01	.01	.03	-.03	-.25
Failure Task	7.03	6.45	5.93	-.15	-.08	-.21	.08	-.12	-.12
Failure Luck	4.35	2.39	2.37	-.11	-.09	-.17	-.16	-.02	-.10
Failure Teacher	6.91	6.27	4.59	-.08	-.23	-.29	.05	-.14	-.23
Writing									
Task Efficacy	73.71	77.88	78.61	.39	.12	.14	.34	.13	.11
Component Efficacy	81.60	86.87	86.73	.57	.09	.34	.37	.07	.53
Outcome Expectancy	4.95	5.24	4.82	.23	.05	-.07	.18	.04	-.13
Success Ability	9.00	8.55	8.93	-.10	-.10	.11	-.07	-.13	.18
Success Skill	7.72	8.23	9.04	.06	.11	.04	.04	-.08	-.04
Success Effort	10.33	9.73	9.74	-.38	.16	.26	-.23	.04	.02
Success Enjoyment	6.59	7.75	7.78	-.08	-.16	.26	.07	-.17	-.05
Success Task	4.90	5.41	4.48	-.29	-.15	.20	-.06	-.16	.14
Success Luck	.55	.42	.30	.06	-.30	-.78	.09	-.05	-.52
Success Teacher	5.93	4.94	3.67	-.12	-.39	.25	.10	-.05	.05
Failure Ability	7.35	7.34	7.74	-.03	-.07	.22	.12	-.19	.28
Failure Skill	6.69	6.81	8.15	.04	.05	.35	-.04	.24	.24
Failure Effort	8.31	8.80	10.00	-.01	.11	.21	.06	.02	-.03
Failure Enjoyment	6.03	7.09	6.19	-.19	-.02	.30	.01	-.13	.19
Failure Task	5.93	6.45	5.93	-.01	-.07	-.15	.28	-.25	.07
Failure Luck	4.79	2.22	2.48	-.05	-.05	-.14	-.12	-.08	.02
Failure Teacher	5.97	5.61	5.59	-.08	-.18	-.35	.14	-.30	-.20

Table 4
Correlations Between Original Variables and The First Canonical Variate

Variable	Correlation
Dependent	
Reading Comprehension (DRP)	.96
Writing Conventions	.23
Writing Syntactic Maturity	.35
Writing Style	.26
Writing Organization	.54
Independent	
Reading	
Task Efficacy	.47
Component Efficacy	.56
Outcome Expectancy	.10
Success Ability	-.27
Success Skill	.18
Success Effort	.08
Success Enjoyment	.03
Success Task Difficulty	-.03
Success Luck	-.22
Success Teacher Practices	-.17
Failure Ability	.09
Failure Skill	-.03
Failure Effort	.22
Failure Enjoyment	.02
Failure Task Difficulty	-.19
Failure Luck	-.23
Failure Teacher Practices	-.27
Writing	
Task Efficacy	.46
Component Efficacy	.56
Outcome Expectancy	.17
Success Ability	-.09
Success Skill	.14
Success Effort	-.19
Success Enjoyment	-.03
Success Task Difficulty	-.24
Success Luck	-.17
Success Teacher Practices	-.32
Failure Ability	.03
Failure Skill	.19
Failure Effort	.15
Failure Enjoyment	-.07
Failure Task Difficulty	.00
Failure Luck	-.19
Failure Teacher Practices	-.22
TOLT	.63
Locus of Control (External Direction)	-.11